

(19)

Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 861 708 A1

(12)

EUROPEAN PATENT APPLICATION

published in accordance with Art. 158(3) EPC

(43) Date of publication:

02.09.1998 Bulletin 1998/36

(51) Int. Cl.⁶: B25C 5/04

(21) Application number: 96938490.8

(86) International application number:

PCT/JP96/03370

(22) Date of filing: 18.11.1996

(87) International publication number:

WO 97/18063 (22.05.1997 Gazette 1997/22)

(84) Designated Contracting States:

BE DE ES FR GB NL SE

(72) Inventors:

- MOCHIZUKI, Naoto
Minamikoma-gun Yamanashi-ken 400-05 (JP)
- KAJIMURA, Takashi
Minamikoma-gun Yamanashi-ken 400-05 (JP)

(30) Priority: 16.11.1995 JP 322351/95

(71) Applicants:

- Nisca Corporation
Minamikoma-gun, Yamanashi-ken 400-05 (JP)
- ACCO USA, INC.
Wheeling, IL 60090-6070 (US)

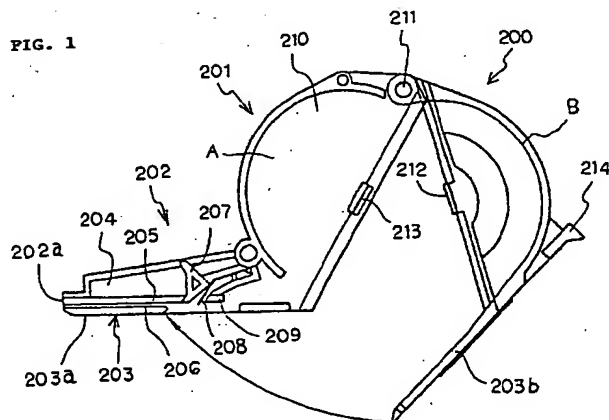
(74) Representative:

KJunker . Schmitt-Nilson . Hirsch
Winzererstrasse 106
80797 München (DE)

(54) STAPLER AND STAPLE CARTRIDGE

(57) Even if the casing is provided with a retainer spring (208) and the staple blank strip (300) is provided with a stopper portion (303) at the trailing end portion thereof, the staple cartridge can be refilled with a new staple blank strip (300) without necessity of disassembling

of the casing body (210). The casing is provided with an openable cover B which opens a part of the casing behind a position between the leading end (202a) of the casing and the engagement portion (209) so that the staple blank strip (300) can be replaced.



EP 0 861 708 A1

Description

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to a staple cartridge containing therein a staple blank strip which is formed of a number of straight staple blanks, each being a straight short wire to be bent into a staple, connected side by side into a strip of a length, and a stapler on which such a staple cartridge is removably mounted.

Description of the Related Art

There has been known an electric stapler in which, as shown in Figure 16, a staple cartridge 402 containing therein a staple blank strip 401 which is formed of a number of straight staple blanks 400 connected side by side into a strip of a length is removably mounted on a stapler body, a leading end portion of the staple blank strip 401 extending outside the staple cartridge 402 is fed in the direction of arrow 404 into a retainer channel 409a of a forming block 409 by a feeding mechanism, the frontmost staple blank 401a held in the retainer channel 402 is formed into a staple of a channel shape by a stroke (arrow 406) of a driver 405 and a former 410, and the staple is struck into a sheet stack by a further stroke of the driver 405.

As shown in Figure 17, a staple sensor 501 disposed at a predetermined distance from the frontmost staple blank 401a detects the trailing end of the staple blank strip 401, the staple cartridge 402 is replaced with a new one and the consumed staple cartridge is discarded.

However since the staple sensor 501 is disposed at a predetermined distance from the frontmost staple blank 401a, there still remain a certain number of staple blanks in the cartridge 402 at the time the staple sensor 501 detects the trailing end of the staple blank strip 401. Accordingly when the staple cartridge 402 is replaced immediately after detection of the trailing end of the staple blank strip 401 by the staple sensor 501, the staple blanks remaining in the staple cartridge 402 are wasted. Therefore normally the staple cartridge 402 is replaced when stapling is performed a certain number of times after detection of the trailing end of the staple blank strip 401 by the staple sensor 501.

However since the cartridge 402 is provided with a retainer spring 403 in order to prevent reverse feed of the staple blank strip 401 as shown in Figure 17, a fraction of the staple blank strip 401 remaining in the old cartridge is left in the stapler body if the old cartridge is replaced with a new one after the trailing end of the staple blank strip 401 passes the retainer spring 403. When a new staple cartridge is mounted on the stapler body in this state, the arrangement of the staple blanks is broken in the stapler, which can result in defective sta-

pling and/or staple jamming.

In order to avoid this problem, conventionally, the trailing end portion of the staple blank strip 401 is bent upward to form a stopper portion 401' and an engagement portion 403' adapted to be engaged with the stopper portion 401' on the staple blank strip 401 is provided on the retainer spring 403 as shown in Figure 17. With this arrangement, when the stopper portion 401' on the trailing end of the staple blank strip 401 is brought into engagement with the engagement portion 403' while stapling is continued after detection of the trailing end of the staple blank strip 401 by the staple sensor 501, feed of the staple blank strip 401 is mechanically prevented. See Japanese Patent Publication No. 6(1994)-9792.

Thus conventionally the staple cartridge is replaced when the amount of staple blanks remaining in the cartridge is reduced to a predetermined value and the consumed cartridge is discarded anyway.

However since the cartridge casings are formed of synthetic resin, the disposal of the cartridges is difficult and leads to wastage of resources. On the other hand, recovering the cartridges from users and refilling the cartridges, or recycling the cartridges takes a lot of labor and adds to cost of products.

Thus it is desired that the staple cartridge can be refilled on the spot. However this attempt will encounter the following difficulties.

(1) Since the staple cartridge is provided with a retainer spring 403 in order to prevent reverse feed of the staple blank strip 401, a refill staple blank strip 401 cannot be inserted in the reverse direction into the casing through the outlet port.

(2) Since the stopper portion 401' is formed on the trailing end of the staple blank strip 401 in order to prevent a residual fraction of the staple blank strip 401 from being left in the stapler, the fraction of the staple blank strip 401 left in the cartridge case cannot be removed through the outlet port.

Accordingly, at present, refill of the staple cartridge necessarily involves disassembly and reassembly of the cartridge case.

In view of the foregoing observations and description, the primary object of the present invention is to provide a staple cartridge which can be refilled with a staple blank strip without disassembly of the cartridge casing even if the staple cartridge is provided with a retainer spring and/or the staple blank strip is provided with a stopper portion at its trailing end.

DISCLOSURE OF THE INVENTION

In order to accomplish the above object, the present invention has the following arrangement.

In accordance with the invention defined in Claim 1, there is provided a stapler comprising a staple cartridge which consists of a casing and a staple blank strip con-

tained in the casing and is removably mounted on a stapler body, a staple detecting means which detects that the amount of staple blanks remaining in the casing becomes a predetermined value, a staple drive means which bends each of the staple blanks in the staple blank strip into a staple in sequence from the leading end of the staple blank strip and drives the staple into a sheet stack to be stapled, a staple blank strip feed means which feeds the staple blank strip to the staple drive means, and a clinching means which bends the ends of the staple driven into the sheet stack, wherein

the staple blank strip is provided with a stopper portion at the trailing end portion thereof, and the casing of the staple cartridge is provided with

an engagement portion which is disposed forward of a position where the staple detecting means detects that the amount of staple blanks remaining in the casing is reduced to a predetermined value and is brought into abutment against the stopper portion on the staple blank strip to prevent further feed of the staple blank strip,

a reverse preventing means which is disposed between the leading end of the casing and the engagement portion and prevents the staple blank strip from being reversed, and

an openable cover which opens a part of the casing behind a position between the leading end of the casing and the engagement portion so that the staple blank strip can be replaced.

In the invention of Claim 1, a fraction of the staple blank strip does not remain in the stapler and is removed together with the casing by virtue of engagement of the engagement portion with the stopper portion when the staple cartridge is removed from the stapler after stapling of a certain number of times after detection of the trailing end of the staple blank strip by the staple sensor. When the openable cover is opened, the remaining fraction of the staple blank strip can be disengaged from the reverse preventing means and/or the engagement portion and removed from the casing. Accordingly the consumed staple cartridge can be reused without discarding the cartridge by refilling the casing with a new staple blank strip.

A stapler in accordance with the invention defined in Claim 2 is basically the same as that of the invention defined in Claim 1 except that the casing is provided with an openable cover which opens a part of the casing behind the leading end of the casing, in place of the cover which opens a part of the casing behind a position between the leading end of the casing and the engagement portion. In the stapler of the invention defined in Claim 2, the openable cover gives access to the reverse preventing means and the engagement portion, and accordingly the remaining fraction of the staple blank strip can be removed by opening the cover and the car-

tridge casing can be refilled with a new staple blank strip.

A stapler in accordance with the invention defined in Claim 3 is basically the same as that of the invention defined in Claim 1 except that the casing is provided with an openable cover which opens a part of the casing behind a position between the leading end of the casing and the reverse preventing means, in place of the cover which opens a part of the casing behind a position between the leading end of the casing and the engagement portion. Also in the stapler of Claim 3, the openable cover gives access to the reverse preventing means and the engagement portion, and accordingly the remaining fraction of the staple blank strip can be removed by opening the cover and the cartridge casing can be refilled with a new staple blank strip.

A stapler in accordance with the invention defined in Claim 4 is basically the same as that of the Claim 1 except that the casing is provided with an openable cover which opens a part of the casing behind a position between the reverse preventing means and the engagement portion, in place of the cover which opens a part of the casing behind a position between the leading end of the casing and the engagement portion. In the stapler of this aspect, the openable cover gives access to the engagement portion, and accordingly though the remaining fraction of the staple blank strip is held by the reverse preventing means, it can be removed by cutting the stopper portion at the trailing end thereof and drawing the fraction in the direction of feed of the staple blank strip to the stapler. Then the cartridge casing can be refilled with a new staple blank strip.

In the staplers of Claims 1 to 4, the openable cover may be hinged to the casing body at the rear edge of the opening which the openable cover closes and opens (Claim 5), may be mounted on the casing body to be slidable in the longitudinal direction of the casing body (Claim 6), may be hinged to the casing body at a side edge of the opening (Claim 7), or may be mounted on the casing body to be slidable in the transverse direction of the casing body (Claim 8).

It is preferred that the casing be provided with a locking means for locking the cover to the casing body. (Claim 9)

Specifically the casing body is formed of transparent synthetic resin and the reverse preventing means is formed of a metal spring (Claim 10). The staple drive means may comprise, for instance, a driver, and a pair of drive arms which are connected to opposite sides of the driver and move up and down the driver, and a motor which is disposed on the clinching means side and drives the drive arms to move up and down the driver (Claim 11). Further it is preferred that the staple drive means and the clinching means be connected to each other by a pivot shaft to be rotatable relative to each other and the pivot shaft also functions as a driving force transmission shaft for transmitting the driving force to the drive arms and as a pivot shaft on which a lever

for fixing the staple cartridge is supported for rotation. (Claim 12) This arrangement is advantageous in simplifying the structure of the stapler and reducing the overall size of the stapler. It is preferred that the clinching means be provided with a stopper member for preventing a jammed staple from entering the inside of the stapler. (Claim 13)

Claims 14 to 25 are inventions of staple cartridge itself.

In accordance with the invention of Claim 14, there is provided a staple cartridge which comprises a casing and a staple blank strip contained in the casing and is removably mounted on a stapler so that the staple blanks of the staple blank strip is formed into a staple and driven into a sheet stack to be stapled one by one by operation of the stapler, where the improvement comprises that

the staple blank strip is provided with a stopper portion at the trailing end portion thereof, and the casing is provided with an engagement portion which, when the amount of staple blanks remaining in the casing is reduced to a predetermined value, is brought into abutment against the stopper portion on the staple blank strip to prevent further feed of the staple blank strip, a reverse preventing means which is disposed between the leading end of the casing and the engagement portion and prevents the staple blank strip from being reversed, and an openable cover which opens a part of the casing behind a position between the leading end of the casing and the engagement portion so that the staple blank strip can be replaced.

In the invention of Claim 14, a fraction of the staple blank strip does not remain in the stapler and is removed together with the casing by virtue of engagement of the engagement portion with the stopper portion when the staple cartridge is removed from the stapler after stapling of a certain number of times after detection of the trailing end of the staple blank strip by the staple sensor. When the openable cover is opened, the remaining fraction of the staple blank strip can be disengaged from the reverse preventing means and/or the engagement portion and removed from the casing. Accordingly the consumed staple cartridge can be reused without discarding the cartridge by refilling the casing with a new staple blank strip.

A staple cartridge in accordance with the invention of Claim 15 is basically the same as that of Claim 14 except that the casing is provided with an openable cover which opens a part of the casing behind the leading end of the casing, in place of the cover which opens a part of the casing behind a position between the leading end of the casing and the engagement portion. In the staple cartridge of Claim 15, the openable cover gives access to the reverse preventing means and the

engagement portion, and accordingly the remaining fraction of the staple blank strip can be removed by opening the cover and the cartridge casing can be refilled with a new staple blank strip.

A staple cartridge of Claim 16 is basically the same as that of Claim 14 except that the casing is provided with an openable cover which opens a part of the casing behind a position between the leading end of the casing and the reverse preventing means in place of the cover which opens a part of the casing behind a position between the leading end of the casing and the engagement portion. Also in the staple cartridge of Claim 16, the openable cover gives access to the reverse preventing means and the engagement portion, and accordingly the remaining fraction of the staple blank strip can be removed by opening the cover and the cartridge casing can be refilled with a new staple blank strip.

A staple cartridge Claim 17 is basically the same as that of Claim 14 except that there is provided an openable cover which opens a part of the casing behind a position between the reverse preventing means and the engagement portion in place of the cover which opens a part of the casing behind a position between the leading end of the casing and the engagement portion. In the staple cartridge of Claim 17, the openable cover gives access to the engagement portion, and accordingly though the remaining fraction of the staple blank strip is held by the reverse preventing means, it can be removed by cutting the stopper portion at the trailing end thereof and drawing the fraction in the direction of feed of the staple blank strip to the stapler. Then the cartridge casing can be refilled with a new staple blank strip.

In accordance with the invention of Claim 18, there is provided a staple cartridge comprising a casing and a staple blank strip contained in the casing, the casing being provided with a circular chamber portion, an extension which extends tangentially to the chamber portion, and a retainer spring which is disposed in the extension and prevents the staple blank strip from being reversed, wherein the improvement comprises that

the casing is provided with an openable cover which can be opened along a parting line on the bottom of the extension between the leading end of the casing and the retainer spring to open a part of the casing behind the parting line, thereby permitting replacement of the staple blank strip. In the staple cartridge of Claim 18, the aforesaid stopper portion at the trailing end of the staple blank strip and the engagement portion to be brought into engagement with the stopper portion may be provided or need not be provided. Also in the staple cartridge, the staple blank strip can be replaced by opening the openable cover and releasing the fraction of the staple blank strip from the retainer spring.

In the staple cartridges of Claims 14 to 18, the openable cover may be hinged to the casing body at the rear edge of the opening which the openable cover closes and opens (Claim 19), may be mounted on the casing body to be slidable in the longitudinal direction of the casing body (Claim 20), may be hinged to the casing body at a side edge of the opening (Claim 21), or may be mounted on the casing body to be slidable in the transverse direction of the casing body (Claim 22). It is preferred that the casing be provided with a locking means for locking the cover to the casing body (Claim 23).

For example, the locking means may comprise a lock arm which is formed on one of the casing body and the openable cover and is wedge-shaped in cross-section and a lock bearing having a recess complementary to the lock arm in shape which is formed on the other of the casing body and the openable cover so that the lock arm and the lock bearing are brought into engagement with each other when the openable cover is closed (Claim 24). Since the casing can be resiliently deformed in the direction of width of the staple blank strip, when the cover is closed and pressed against the casing body, the lock arm is slid on the inner surface of the lock bearing into engagement therewith. However when there remains a large amount of staple blank strip in the casing, the staple blank strip suppresses resilient deformation of the casing and it is difficult to disengage the lock arm from the lock bearing. Accordingly, an event such that the cover is opened by accident before the staple blank strip is consumed up can be avoided.

It is preferred that the casing is formed of transparent synthetic resin and the reverse preventing means be formed of a metal spring (Claim 25).

Specifically the present invention results in the following excellent effects.

1) In the inventions of Claims 1 and 14, the staple blank strip is provided with a stopper portion at the trailing end portion thereof, and the casing is provided with an engagement portion which is brought into abutment against the stopper portion on the staple blank strip to prevent further feed of the staple blank strip and a reverse preventing means which is disposed between the leading end of the casing and the engagement portion and prevents the staple blank strip from being reversed. The casing is further provided with an openable cover which opens a part of the casing behind a position between the leading end of the casing.

Accordingly, in the invention of Claim 1 or 14, when the openable cover is opened, the remaining fraction of the staple blank strip can be disengaged from the reverse preventing means and/or the engagement portion and removed from the casing. Accordingly the consumed staple cartridge including the retainer spring and the engagement portion can be reused without discarding the cartridge by

removing the remaining fraction of the staple blank strip and refilling the casing with a new staple blank strip.

Further the remaining fraction of the staple blank strip does not remain in the stapler and is removed together with the casing by virtue of engagement of the engagement portion with the stopper portion when the staple cartridge is removed from the stapler after stapling of a certain number of times after detection of the trailing end of the staple blank strip by the staple sensor.

2) In the inventions of Claims 2 and 15, the casing is provided with an openable cover which opens a part of the casing behind the leading end of the casing. The openable cover gives access to the reverse preventing means and the engagement portion, and accordingly the remaining fraction of the staple blank strip can be removed by opening the cover and the cartridge casing can be refilled with a new staple blank strip.

3) In the inventions of Claims 3 and 16, the casing is provided with an openable cover which opens a part of the casing behind a position between the leading end of the casing and the reverse preventing means. The openable cover gives access to the reverse preventing means and the engagement portion, and accordingly the remaining fraction of the staple blank strip can be removed by opening the cover and the cartridge casing can be refilled with a new staple blank strip.

4) In the inventions of Claims 4 and 17, the casing is provided with an openable cover which opens a part of the casing behind a position between the leading end of the casing and the engagement portion. By opening the cover, the remaining refraction of the staple blank strip can be removed by cutting the stopper portion at the trailing end thereof and drawing the fraction in the direction of feed of the staple blank strip to the stapler. Then the cartridge casing can be refilled with a new staple blank strip.

5) The effect that the cartridge casing can be refilled with a new staple blank strip can be obtained also in the staple cartridges where only the reverse preventing means is provided (Claim 18), the openable cover is hinged to the casing body at the rear edge of the opening which the openable cover closes and opens (Claims 5 and 19), the openable cover is mounted on the casing body to be slidable in the longitudinal direction of the casing body (Claims 6 and 20), the openable cover is hinged to the casing body at a side edge of the opening (Claims 7 and 21), or the openable cover is mounted on the casing body to be slidable in the transverse direction of the casing body (Claims 8 and 22).

6) In the inventions of Claims 9 and 23, since the casing is provided with a locking means for locking the cover to the casing body, the openable cover

and the casing body are integrated handling of the staple cartridge is facilitated.

7) In the invention of Claim 24, the locking means comprises a lock arm which is formed on one of the casing body and the openable cover and is wedge-shaped in cross-section and a lock bearing having a recess complementary to the lock arm in shape which is formed on the other of the casing body and the openable cover so that the lock arm and the lock bearing are brought into engagement with each other when the openable cover is closed. Since the casing can be resiliently deformed in the direction of width of the staple blank strip, when the cover is closed and pressed against the casing body, the lock arm is slid on the inner surface of the lock bearing into engagement therewith. However when there remains a large amount of staple blank strip in the casing, the staple blank strip suppresses resilient deformation of the casing and it is difficult to disengage the lock arm from the lock bearing. Accordingly, an event such that the cover is opened by accident before the staple blank strip is consumed up can be avoided.

8) According to the inventions of Claims 10 to 13 and 25, arrangements easy to realize can be obtained.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a side view showing a staple cartridge in accordance with a first embodiment of the present invention with the cover opened,
 Figure 2 is a perspective view of a staple blank strip employed in the staple cartridge,
 Figure 3 is a side view showing the cover of the staple cartridge,
 Figure 4 is a cross-sectional view taken along line IV-IV in Figure 3,
 Figure 5 is a side view of a stapler in accordance with an embodiment of the present invention,
 Figure 6 is a plan view of the stapler,
 Figure 7 is a front view of the stapler,
 Figure 8 is a cross-sectional view of the stapler,
 Figure 9 is a cross-sectional view showing the head unit of the stapler,
 Figure 10 is an enlarged side view showing a part of the stapler,
 Figures 11 to 15 are views respectively showing staple cartridges in accordance with second to sixth embodiments of the present invention,
 Figure 16 is a view for illustrating operation of a stapler and a staple cartridge according to a prior art, and
 Figure 17 is a view which schematically shows the arrangement of a conventional staple cartridge.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In Figures 1 and 2, a staple cartridge 200 in accordance with a first embodiment of the present comprises a casing 210 and a staple blank strip 300 contained in the casing 210. The staple blank strip 300 is of a well known type and comprises a number of straight staple blanks 301, each being a straight short wire to be bent into a staple, bonded to an adhesive tape 302 at their central portions side by side into a strip of a length as shown in Figure 2. The trailing end portion of the staple blank strip 300 is bent to form a stopper portion 303.

The casing 210 is formed of transparent synthetic resin and is openable to permit replacement of the staple blank strip 300. The casing 210 contains the staple blank strip 300 so that the staple blank strip 300 can be drawn out to feed the leading end of the staple blank strip 300 to a stapling position, that is, into a retainer channel of a forming block.

More specifically the casing 210 comprises a circular chamber portion 201 in which a rolled portion 304 of the staple blank strip 300 is contained and an extension 202 which extends tangentially to the chamber portion 201 and through which the leading end portion 305 unrolled from the roller portion 304 of the staple blank strip 300 is drawn out.

The extension 202 comprises a bottom plate 203, a pair of opposed side wall portion 204 erected from opposite side edges of the bottom plate 203, and a pair of guide protrusions 205 formed on the inner surfaces of the side wall portions 204 and a staple blank strip feed passage 206 is formed by the bottom plate 203, the side wall portions 204 and the guide protrusions 205.

A projection 207 extends between the side wall portions 204 at an intermediate portion of the extension 202 and a base of a retainer spring 208 in the form of a metal spring plate is fixed to the extension 202 at an intermediate portion thereof. The projection 207 forms a support of a feed spring 91 on the open end side. The leading end portion of the retainer spring 208 presses the staple blank strip at a predetermined pressure. An engagement portion 209 which is adapted to be brought into engagement with the stopper portion 303 on the trailing end of the staple blank strip 300 to prevent feed of the staple blank strip 300 is provided on the extension 202 behind the leading end portion of the retainer spring 208. The engagement portion 209 is positioned downstream of a staple sensor 14 (reflective photodetector), for detecting the trailing end of the staple blank strip 300, as seen in the direction of feed of the staple blank strip 300 as shown in Figure 9.

The casing 210 is divided into a body portion A and an openable cover B in a position between the leading end of the casing 210, i.e., the leading ends 202a of the extension 202, and the engagement portion 209. The openable cover B is hinged to the body portion A by a pivot 211 provided near the top of the chamber portion 201.

In this particular embodiment, the chamber portion 201 is divided along an off-centered line so that a larger space of the chamber portion 201 is included in the body portion A. The extension 202 is divided so that the side wall portions 204, the guide protrusions 205, the projection 207 and the retainer spring 208 are on the body portion side. In this particular embodiment, the front half 203a of the bottom plate 203 is on the body portion side and the rear half 203b of the bottom plate 203 is on the openable cover side. The bottom plate 203 is cut into the front and rear halves 203a and 203b along a line forward of the retainer spring 208.

Further as shown in Figures 1, 3 and 4, a lock arm 212 which is wedge-shaped in cross-section is formed on each side of the cover B near the center of the chamber portion 201 and a lock bearing 213 having a wedge-shaped recess is formed on each side of the body portion A near the center of the chamber portion 201 so that the lock arms 212 and the lock bearings 213 are brought into engagement with each other when the cover B is closed, thereby locking the cover B to the body portion A. That is, since the casing 210 can be resiliently deformed in the direction of width of the staple blank strip 300, when the cover B is closed and pressed against the body portion A, the lock arms 212 are slid on the inner surface of the lock bearings 213 into engagement therewith while the body portion A is slightly expanded outward. Since the lock arms 212 are wedge-shaped in cross-section, though they can be slid on the inner surface of the lock bearings 213 into engagement therewith, it is difficult to deform inward the cover B to disengage the lock arms 212 from the lock bearings 213 when there remains a large amount of staple blank strip 300 in the casing 210. Accordingly, an event such that the cover B is opened by accident when the staple cartridge 200 is mounted on the stapler.

A stapler on which the staple cartridge 200 of this embodiment is mounted will be described hereinbelow.

In Figures 5 to 10, the stapler 1 comprises a frame 2, a head unit 3, a staple drive means 4 which bends each of the staple blanks 301 in the staple blank strip 300 into a staple in sequence from the leading end of the staple blank strip 300 and drives the staple into a sheet stack to be stapled, a clinching means 5 which bends the ends of the staple driven into the sheet stack, and a staple blank strip feed means 6 which feeds the staple blank strip 300 to the staple drive means 4.

The frame 2 comprises a hollow base portion 20 and a pair of side walls 22 extending upward from opposite sides of the base portion 20. An anvil 21 which forms the clinching means 5 is supported on an upper front portion of the base portion 20. A body 30 of the head unit 3 is disposed between the side walls 22 and hinged to the base portion 20 at its rear end to be rotatable up and down by a pivot shaft 31. That is, the staple drive means 4 and the clinching means 5 are connected to be rotatable relative to each other about the pivot shaft 31.

A front outer cover 40 is provided forward of the body 30 and a former 70 for bending a staple blank 301 into a channel-shaped staple is disposed between the body 30 and the front outer cover 40. A forming block (bending block) 60 extends through the front outer cover 40 and is pressed by a spring 50. The body 30, the front outer cover 40, the former 70, the forming block 60 and the spring 50 form the head unit 3.

The body 30 comprising a receiving base portion 32 for receiving the extension 202 of the staple cartridge 200, an erected portion 34 which extends upward from a front end portion of the receiving base portion 32, a top portion 35 which extends over the receiving base portion 32 from the top of the erected portion 34 and a guide pole 36 erected on the top portion 35. An upper head portion 81 of a driver 80 disposed above the body 30 is fitted on the guide pole 36 to be movable up and down. The driver 80 comprises the upper head portion 81, a pusher claw 84 and a driving blade 86. The upper head portion 81 is pushed and pulled by a pair of drive arms 55 on opposite sides thereof to be rotated about the pivot shaft 31.

A one-cycle drive motor 51 which can rotate in both the regular and reverse directions and drives the drive arms 55 to move up and down the driver 80 is disposed on a rear portion of the base portion 20 on which the anvil 21 is supported.

The drive motor 51, the drive arms 55 and the driver 80 form the staple drive means 4. A pinion is fixed to the output shaft of the drive motor 51 and a pair of large gears 54 are respectively mounted for rotation on the outer surface of the side walls 22. Rotation of the drive motor 51 is transmitted to the large gears 54 through gears 52 and 53. The gear 53 is mounted on the pivot shaft 31 for the body 30 and accordingly the pivot shaft 31 doubles as a drive shaft for transmitting driving force to the drive arms 55. Further also a cartridge lock lever 101 is mounted for rotation on the pivot shaft 31. Thus the stapler can be simple in structure and small in size.

The drive arms 55 are mounted for rotation on the side walls 22 by an arm shaft 56. Each of the drive arms 55 is provided with an elongated opening 55a having a cam surface 57 in one end portion thereof and a slit 55b in the other end portion thereof. A drive roller 58 erected on the outer side of the large gear 54 is in engagement with the cam surface 57 of the opening 55a. When the large gear 54 is rotated, the slit side end portion of the drive arm 55 is rotated up and down by way of engagement of the roller 58 with the cam surface 57, whereby the driver 80 is moved up and down to press downward and lift up the driving blade 86. The arm shaft 56 extends through elongated holes, which are long in the vertical direction, formed in the side walls 22 to be slightly movable up and down. The arm shaft 56 is urged downward by a coiled spring 59 tensed between the arm shaft 56 and an ear 22a formed on the side wall 22.

In order to form a staple blank strip feeding means

6, a feeder 90 which is provided with the feed spring 91 and a feeding claw 92 is disposed adjacent to the erected portion 34 of the body 30. The feeder 90 is supported for rotation on a shaft 93. The forming block 60 having a retainer channel 64 for holding the staple blank 301 is disposed in front of an opening 100 in the erected portion 34 to be movable left and right as seen in Figure 9. The forming block 60 is urged toward the erected portion 34 by the spring 50.

A staple cartridge 200 is removably mounted adjacent to the feeder 90. As described above, the staple cartridge 200 is provided with the projection 207, which forms a support of the feed spring 91 on the open end side, on the extension 202 thereof and the retainer spring 208 for holding the staple blank strip 300.

The former 70 is disposed adjacent to the driving blade 86 and is moved downward by a predetermined distance pushed by the pusher claw 84 on the driver 80 when the driver 80 is moved downward. The former 70 is provided with a projection 75, and when the driving blade 86 is moved upward, the projection 75 is brought into engagement with an elongated hole 82 in the driving blade 86, whereby the former 70 is lifted. The pusher claw 84 is disengaged from the former 70 after pushing downward the former 70 by a predetermined distance.

The projection 75 on the former 70 pushes a cam surface 94 on the feeder 90 when the former 70 is moved downward, whereby the feeder 90 is rotated counterclockwise in Figure 9 about a shaft 93 to move the feeding claw 92 rearward to a retracted position. When the former 70 is moved upward and the feeder 90 is released, the feeder 90 is returned to its advanced position under the force of the feed spring 91 and the feeding claw 92 feeds the staple blank strip 300 by a predetermined distance.

When the large gears 54 are rotated in the same phase by the drive motor 51, the roller 68 (Figure 5) rolls on the cam surface 57 and the drive arms 55 are rotated about the arm shaft 56, whereby the slit side end portion of each drive arm 55 is rotated downward to move downward the head portion 81 of the driver 80. Then the driving blade 86 is pushed downward and the body 30 is rotated downward about the pivot shaft 31 toward the anvil 21. As a result, the body 30 and the anvil 21 are opposed to each other in a stapling position intervening therebetween a sheet stack to be stapled.

As shown in Figures 8 and 10, a stopper member 23 in the form of a rectangular pole extends transversely on the upper surface of the anvil 21 behind the throat of the stapler into which the sheet stack to be stapled is inserted. The stopper member 23 prevents a staple from entering the inside of the stapler (the right side in Figure 10) when stapler jamming takes place.

(1) Normal action of one cycle

The normal action of one cycle of the stapler will be

described hereinbelow. For the purpose of simplification of description, it is assumed that the staple blank strip 300 in the staple cartridge 200 has been fed to the forming block 60 through the opening 100 in the erected portion 34 by the feeding claw 92 of the feeder 90 and the middle portion of the frontmost staple blank 301 has been held in the retained channel 64 of the forming block 60.

In Figure 5 to 10, torque of the drive motor 51 is reduced in speed by the gears 52 and 53 and is transmitted to the large gears 54. When the large gears 54 are rotated by a predetermined angle corresponding to the home position, the drive arms 55 start to push downward the driver 80 and the body 30 begins to move downward away from the home position. When the body 30 is brought into abutment against a sheet stack on the base portion 20, the driving blade 86 is moved downward relative to the body 30 and the former 70 is moved downward pushed by the pusher claw 84 to bend the end portions of the straight staple blank 301 held on the forming block 60 and form the staple blank 301 into a channel-shaped staple. Further the driving blade 86 is pushed downward and the pusher claw 84 is disengaged from the former 70 and only the driving blade 86 is further moved downward. The driving blade 86 is brought into abutment against an inclined surface of the forming block 60 and further moved downward while displacing the forming block 60 sideways, thereby cutting the frontmost staple blank 301, which has been formed into a staple, off the staple blank strip 300 in front of the erected portion 34 and drives the staple into the sheet stack. The position of the elements in this state will be referred to as "clinch position" hereinbelow.

While the drive arms 55 and the body 30 stay in the clinching position, a pair of clinch levers 24 hung downward from the base portion 20 are pushed upward by supports 25 from below and are displaced in the anvil 21 to bend flat the end portions of the staple projecting through the sheet stack. Each of the supports 25 is formed on one end of a lever 26 which is in engagement with a cam surface (not shown) on the large gear 54 at its other end and is rotated about a shaft 27 by the large gear 54 overcoming the force of a spring plate 28.

Then the body 30 comes to be moved upward away from the clinching position, which moves upward the driver 80 and the driving blade 86 to the home position. Further the drive arms 55 and the body 30 are returned to the home position shown in Figure 5. Thus one cycle of stapling is ended. The one cycle of stapling corresponds to one turn of the large gears 54. Though in this embodiment the staple is bent in flat clinching, the staple may be clinched in a well known glass clinching in the anvil 21.

When the driving blade 86 is returned to the home position, that is, when the projection 75 on the former 70 is returned to the home position, the feeder 90 is rotated clockwise in Figure 9 under the resiliency of the feeder

spring 91 and the feeding claw 92 is moved forward from the retracted position, whereby the next staple blank 301 of the staple blank strip 300 is fed into the retainer channel 64 of the forming block 64 and preparation for the next stapling is made.

(Replacement of the staple cartridge)

As shown in Figure 9, the staple sensor 14 is a reflective sensor comprising a photo emitting element and a photo receiving element disposed on the bottom 32a of the receiving base portion 32 of the body 30. The staple sensor 14 detects light reflected from the staple blank strip 300 in the staple cartridge 200 through the transparent casing 210 and constantly monitors existence of the staple blank 301 and outputs an empty signal when the staple blank 301 is consumed. However since the staple sensor 14 is disposed at a distance from the forming block 60, it detects, strictly speaking, that the staple blank strip 300 is about to be consumed.

When the amount of staple blanks remaining in the staple cartridge 200 is reduced to a predetermined value, the trailing end of the staple blank strip 300 is detected by the staple sensor 14. At this time, the consumed staple cartridge 200 is removed from the stapler and is refilled with a new staple blank strip 300.

Since the staple sensor 14 is disposed at a distance from the leading end 202a of the staple cartridge 200, stapling can be continued until the stopper portion 303 on the trailing end of the staple blank strip 300 is brought into abutment against the engagement portion 209 even after the staple sensor 14 detects the trailing end of the staple blank strip 300.

Since the engagement portion 209 is disposed upstream of the retainer spring 208, the stopper portion 303 is necessarily brought into abutment against the engagement portion 209 before the trailing end of the staple blank strip 300 passes the retainer spring 208, and further feed of the staple blank strip 300 is mechanically prevented. Accordingly, whenever the staple cartridge 200 is removed from the stapler 1, the fraction of the staple blank strip 300 remaining in the staple cartridge 200 is necessarily removed together with the staple cartridge 200 and is never left in the stapler 1. Accordingly, when the staple cartridge is refilled with a new staple blank strip 300 is mounted on the stapler in this state, there never arises a problem that the arrangement of the staple blanks left in the stapler is broken and defective stapling and/or staple jamming is caused.

When removing the staple cartridge 200 from the body 30 of the stapler 1, the lock lever 101 is manually clockwise (in Figure 9) rotated about the pivot shaft 31 to disengage a locking claw 101a on the lever 101 from an ear portion 214 on the rear end face of the casing 210.

After the staple cartridge 200 is removed from the stapler 1, the openable cover B of the casing 210 is opened about the pivot 211 as shown in Figure 1 after

releasing the lock arms 212 from the lock bearings 213 by deflecting inward the central portions of the side walls of chamber portion 201 on the cover side. When the cover B is opened, the retainer spring 28 and the engagement portion 209 are exposed from below. Since being fixed to the body portion A of the casing 210, the retainer spring 208 cannot fall off the body portion A. After the fraction of the staple blank strip 300 remaining in the body portion A is removed, the casing 210 can be refilled with a new staple blank strip 300. The leading end portion 305 of the new staple blank strip 300 is inserted into the staple blank strip feed passage 206 formed by the front half 203a of the bottom plate 203 and the guide protrusions 205.

When the cover B is closed, the lock arms 212 and the lock bearings 213 are brought into engagement with each other thereby locking the cover B to the body portion A. Since the lock arms 212 are wedge-shaped in cross-section as shown in Figure 4, though they can be slid on the inner surface of the lock bearings 213 into engagement therewith, it is difficult to deform inward the cover B to disengage the lock arms 212 from the lock bearings 213 after they are once engaged with each other due to interference by the new staple blank strip 300. Accordingly, an event such that the cover B is opened by accident when the staple cartridge 200 is mounted on the stapler.

Further when the cover B is closed, the front half 203a of the bottom plate 203 on the body portion side and the rear half 203b of the bottom plate 203 on the openable cover side are mated together and the staple blank strip feed passage 206 is formed again.

The refilled staple cartridge 200 is mounted on the body 30 of the stapler 1 so that the leading end portion 202a of the staple blank strip feed passage 206 is fitted in the opening 100 (Figure 9) of the body 30. Then the lock lever 101 is manually rotated to bring the locking claw 101a on the lever 101 into engagement with the ear portion 214 on the rear end face of the casing 210, whereby the staple cartridge 200 is correctly located relative to the body 30. When the staple cartridge 200 is thus mounted on the stapler 1, the leading end portion 203c of the bottom plate 203 terminates in the opening 100 of the body 30. The leading end portion 203c determines a reference position when cutting the staple blank strip 300.

The stapler 1 feeds the leading end of the staple blank strip 300 extending outward from the casing 210 into the retainer channel 64 of the forming block by the feed means 6, and bends the frontmost staple blank 301 of the staple blank strip 300 into a staple and drives the staple into the sheet stack by the driver 80.

(Other embodiments)

Though in the embodiment described above, the bottom plate 203 is divided into the body side portion and the cover side portion downstream of the retainer

spring 208 so that the part of the casing 210 behind a position between the leading end 202a of the casing 210 and the retainer spring 208 is openable, the parting line may be set in any position between the leading end 202a of the casing 210 and the engagement portion 209, and the engagement portion 209 may be disposed in any position in the extension 202 of the casing 210.

In the staple cartridge in accordance with the second embodiment of the present invention shown in Figure 11, the parting line of the bottom plate 203 is set upstream of the retainer spring 208 so that the part of the casing 210 behind a position between the retainer spring 208 and the engagement portion 209 is openable about the pivot 211. Though the fraction of the staple blank strip 300 remaining the staple cartridge 200 is held by the retainer spring 208, the fraction can be removed by pulling it in the direction of feed of the staple blank strip 300 after the stopper portion 303 on the trailing end of the staple blank strip 300 is cut off. Since the stopper portion 303 on the trailing end of the staple blank strip 300 is exposed when the cover B is opened, the stopper portion 303 can be cut.

In the staple cartridge in accordance with the third embodiment of the present invention shown in Figure 12, the whole bottom plate 203 is opened about the pivot 211. In this embodiment, since the retainer spring 208 and the engagement portion 209 are both exposed when the cover B is opened, removal of the fraction of the staple blank strip 300 and refilling are facilitated.

Though in the preceding embodiments, the cover B is hinged about an axis disposed on the rear side of the casing 210, the cover B may be mounted on the casing body in other various manners.

For example, in the staple cartridge in accordance with the fourth embodiment of the present invention shown in Figure 13, the openable cover B is opened and closed by sliding the cover B relative to the casing body A in the longitudinal direction of the casing 210.

In the staple cartridge in accordance with the fifth embodiment of the present invention shown in Figure 14, the openable cover B is hinged to one side of the bottom of the casing body A by a pivot 215.

In the staple cartridge in accordance with the sixth embodiment of the present invention shown in Figure 15, the openable cover B which covers the bottom of the casing body A is opened and closed by sliding the cover B relative to the casing body A in the transverse direction of the casing 210.

Also the staple cartridges 200 of the second to sixth embodiments may be provided with a locking mechanism for locking the cover B to the casing body A.

Claims

1. A stapler comprising a staple cartridge which consists of a casing and a staple blank strip contained in the casing and is removably mounted on a stapler body, a staple detecting means which detects

that the amount of staple blanks remaining in the casing becomes a predetermined value, a staple drive means which bends each of the staple blanks in the staple blank strip into a staple in sequence from the leading end of the staple blank strip and drives the staple into a sheet stack to be stapled, a staple blank strip feed means which feeds the staple blank strip to the staple drive means, and a clinching means which bends the ends of the staple driven into the sheet stack, wherein

the staple blank strip is provided with a stopper portion at the trailing end portion thereof, and the casing of the staple cartridge is provided with

an engagement portion which is disposed forward of a position where the staple detecting means detects that the amount of staple blanks remaining in the casing is reduced to a predetermined value and is brought into abutment against the stopper portion on the staple blank strip to prevent further feed of the staple blank strip,

a reverse preventing means which is disposed between the leading end of the casing and the engagement portion and prevents the staple blank strip from being reversed, and an openable cover which opens a part of the casing behind a position between the leading end of the casing and the engagement portion so that the staple blank strip can be replaced.

2. A stapler comprising a staple cartridge which consists of a casing and a staple blank strip contained in the casing and is removably mounted on a stapler body, a staple detecting means which detects that the amount of staple blanks remaining in the casing becomes a predetermined value, a staple drive means which bends each of the staple blanks in the staple blank strip into a staple in sequence from the leading end of the staple blank strip and drives the staple into a sheet stack to be stapled, a staple blank strip feed means which feeds the staple blank strip to the staple drive means, and a clinching means which bends the ends of the staple driven into the sheet stack, wherein

the staple blank strip is provided with a stopper portion at the trailing end portion thereof, and the casing of the staple cartridge is provided with

an engagement portion which is disposed forward of a position where the staple detecting means detects that the amount of staple blanks remaining in the casing is reduced to a predetermined value and is brought into abutment against the stopper portion on the staple blank strip to prevent further feed of the staple blank

strip,

a reverse preventing means which is disposed between the leading end of the casing and the engagement portion and prevents the staple blank strip from being reversed, and
 an openable cover which opens a part of the casing behind the leading end of the casing so that the staple blank strip can be replaced.

3. A stapler comprising a staple cartridge which consists of a casing and a staple blank strip contained in the casing and is removably mounted on a stapler body, a staple detecting means which detects that the amount of staple blanks remaining in the casing becomes a predetermined value, a staple drive means which bends each of the staple blanks in the staple blank strip into a staple in sequence from the leading end of the staple blank strip and drives the staple into a sheet stack to be stapled, a staple blank strip feed means which feeds the staple blank strip to the staple drive means, and a clinching means which bends the ends of the staple driven into the sheet stack, wherein

the staple blank strip is provided with a stopper portion at the trailing end portion thereof, and the casing of the staple cartridge is provided with
 an engagement portion which is disposed forward of a position where the staple detecting means detects that the amount of staple blanks remaining in the casing is reduced to a predetermined value and is brought into abutment against the stopper portion on the staple blank strip,
 a reverse preventing means which is disposed between the leading end of the casing and the engagement portion and prevents the staple blank strip from being reversed, and
 an openable cover which opens a part of the casing behind a position between the leading end of the casing and the reverse preventing means so that the staple blank strip can be replaced.

4. A stapler comprising a staple cartridge which consists of a casing and a staple blank strip contained in the casing and is removably mounted on a stapler body, a staple detecting means which detects that the amount of staple blanks remaining in the casing becomes a predetermined value, a staple drive means which bends each of the staple blanks in the staple blank strip into a staple in sequence from the leading end of the staple blank strip and drives the staple into a sheet stack to be stapled, a staple blank strip feed means which feeds the staple blank strip to the staple drive means, and a

clinching means which bends the ends of the staple driven into the sheet stack, wherein

the staple blank strip is provided with a stopper portion at the trailing end portion thereof, and the casing of the staple cartridge is provided with

an engagement portion which is disposed forward of a position where the staple detecting means detects that the amount of staple blanks remaining in the casing is reduced to a predetermined value and is brought into abutment against the stopper portion on the staple blank strip to prevent further feed of the staple blank strip,

a reverse preventing means which is disposed between the leading end of the casing and the engagement portion and prevents the staple blank strip from being reversed, and
 an openable cover which opens a part of the casing behind a position between the reverse preventing means and the engagement portion so that the staple blank strip can be replaced.

5. A stapler as defined in any one of Claims 1 to 4 in which the openable cover is hinged to the casing at the rear edge of the opening of the casing which the openable cover closes and opens.
6. A stapler as defined in any one of Claims 1 to 4 in which the openable cover is mounted on the casing to be slidable in the longitudinal direction of the casing.
7. A stapler as defined in any one of Claims 1 to 4 in which the openable cover is hinged to the casing at a side edge of the opening.
8. A stapler as defined in any one of Claims 1 to 4 in which the openable cover is mounted on the casing to be slidable in the transverse direction of the casing.
9. A stapler as defined in any one of Claims 1 to 8 in which the openable cover is provided with a locking means for locking the cover to the casing.
10. A stapler as defined in any one of Claims 1 to 4 in which the casing body is formed of transparent synthetic resin and the reverse preventing means is formed of a metal spring.
11. A stapler as defined in any one of Claims 1 to 4 in which the staple drive means comprises a driver, and a pair of drive arms which are connected to opposite sides of the driver and move up and down the driver, and a motor which is disposed on the clinching means side and drives the drive arms to

move up and down the driver.

12. A stapler as defined in Claim 11 in which the staple drive means and the clinching means are connected to each other by a pivot shaft to be rotatable relative to each other and the pivot shaft also functions as a driving force transmission shaft for transmitting the driving force to the drive arms and as a pivot shaft on which a lever for fixing the staple cartridge is supported for rotation. 5
13. A stapler as defined in any one of Claims 1 to 4 in which the clinching means is provided with a stopper member for preventing a jammed staple from entering the inside of the stapler. 15
14. A staple cartridge which comprises a casing and a staple blank strip contained in the casing and is removably mounted on a stapler so that the staple blanks of the staple blank strip is formed into a staple and driven into a sheet stack to be stapled one by one by operation of the stapler, where the improvement comprises that 20
- the staple blank strip is provided with a stopper portion at the trailing end portion thereof, and the casing is provided with 25
- an engagement portion which, when the amount of staple blanks remaining in the casing is reduced to a predetermined value, is brought into abutment against the stopper portion on the staple blank strip to prevent further feed of the staple blank strip, 30
- a reverse preventing means which is disposed between the leading end of the casing and the engagement portion and prevents the staple blank strip from being reversed, and 35
- an openable cover which opens a part of the casing behind a position between the leading end of the casing and the engagement portion 40
- so that the staple blank strip can be replaced.
15. A staple cartridge which comprises a casing and a staple blank strip contained in the casing and is removably mounted on a stapler so that the staple blanks of the staple blank strip is formed into a staple and driven into a sheet stack to be stapled one by one by operation of the stapler, where the improvement comprises that 45
- the staple blank strip is provided with a stopper portion at the trailing end portion thereof, and the casing is provided with 50
- an engagement portion which, when the amount of staple blanks remaining in the casing is reduced to a predetermined value, is brought into abutment against the stopper portion on the staple blank strip to prevent further 55

feed of the staple blank strip,

a reverse preventing means which is disposed between the leading end of the casing and the engagement portion and prevents the staple blank strip from being reversed, and an openable cover which opens a part of the casing behind the leading end of the casing so that the staple blank strip can be replaced.

16. A staple cartridge which comprises a casing and a staple blank strip contained in the casing and is removably mounted on a stapler so that the staple blanks of the staple blank strip is formed into a staple and driven into a sheet stack to be stapled one by one by operation of the stapler, where the improvement comprises that 15

the staple blank strip is provided with a stopper portion at the trailing end portion thereof, and the casing is provided with 20

an engagement portion which, when the amount of staple blanks remaining in the casing is reduced to a predetermined value, is brought into abutment against the stopper portion on the staple blank strip to prevent further feed of the staple blank strip, 25

a reverse preventing means which is disposed between the leading end of the casing and the engagement portion and prevents the staple blank strip from being reversed, and 30

an openable cover which opens a part of the casing behind a position between the leading end of the casing and the reverse preventing means so that the staple blank strip can be replaced. 35

17. A staple cartridge which comprises a casing and a staple blank strip contained in the casing and is removably mounted on a stapler so that the staple blanks of the staple blank strip is formed into a staple and driven into a sheet stack to be stapled one by one by operation of the stapler, where the improvement comprises that 40

the staple blank strip is provided with a stopper portion at the trailing end portion thereof, and the casing is provided with 45

an engagement portion which, when the amount of staple blanks remaining in the casing is reduced to a predetermined value, is brought into abutment against the stopper portion on the staple blank strip to prevent further feed of the staple blank strip, 50

a reverse preventing means which is disposed between the leading end of the casing and the engagement portion and prevents the staple blank strip from being reversed, and 55

an operable cover which opens a part of the

casing behind a position between the reverse preventing means and the engagement portion so that the staple blank strip can be replaced.

18. A staple cartridge comprising a casing and a staple blank strip contained in the casing, the casing being provided with a circular chamber portion, an extension which extends tangentially to the chamber portion, and a retainer spring which is disposed in the extension and prevents the staple blank strip from being reversed, wherein the improvement comprises that

the casing is provided with an openable cover which can be opened along a parting line on the bottom of the extension between the leading end of the casing and the retainer spring to open a part of the casing behind the parting line, thereby permitting replacement of the staple blank strip.

19. A staple cartridge as defined in any one of Claims 14 to 18 in which the openable cover is hinged to the casing at the rear edge of the opening of the casing which the openable cover closes and opens.
20. A staple cartridge as defined in any one of Claims 14 to 18 in which the openable cover is mounted on the casing to be slidable in the longitudinal direction of the casing.
21. A staple cartridge as defined in any one of Claims 14 to 18 in which the openable cover is hinged to the casing at a side edge of the opening.
22. A staple cartridge as defined in any one of Claims 14 to 18 in which the openable cover is mounted on the casing to be slidable in the transverse direction of the casing.
23. A staple cartridge as defined in any one of Claims 14 to 18 in which the openable cover is provided with a locking means for locking the cover to the casing.
24. A staple cartridge as defined in Claim 23 in which the locking means comprises a lock arm which is formed on one of the casing body and the openable cover and is wedge-shaped in cross-section and a lock bearing having a recess complementary to the lock arm in shape which is formed on the other of the casing body and the openable cover so that the lock arm and the lock bearing are brought into engagement with each other when the openable cover is closed.
25. A staple cartridge as defined in any one of Claims 14 to 22 in which the casing body is formed of trans-

parent synthetic resin and the reverse preventing means is formed of a metal spring.

26. A stapler comprising a staple cartridge which contains a staple blank strip and is removably mounted on a stapler body, a staple drive means which bends each of the staple blanks in the staple blank strip into a staple in sequence from the leading end of the staple blank strip and drives the staple into a sheet stack to be stapled, a staple blank strip feed means which feeds the staple blank strip to the staple drive means, and a clinching means which bends the ends of the staple driven into the sheet stack, wherein

the staple cartridge comprises

a casing in which the staple blank strip is contained to be able to be fed to the staple drive means,

a reverse preventing means which is disposed in the casing and prevents the staple blank strip from being reversed, and

an openable cover which is provided on the casing to open a part of the casing behind the leading end of the casing so that the staple blank strip can be replaced.

27. A staple cartridge which comprises a casing and a staple blank strip contained in the casing and is removably mounted on a stapler so that the staple blanks of the staple blank strip is formed into a staple and driven into a sheet stack to be stapled one by one by operation of the stapler, wherein the casing is provided with

a reverse preventing means which prevents the staple blank strip from being reversed, and an openable cover which opens a part of the casing behind the leading end of the casing so that the staple blank strip can be replaced.

FIG. 1

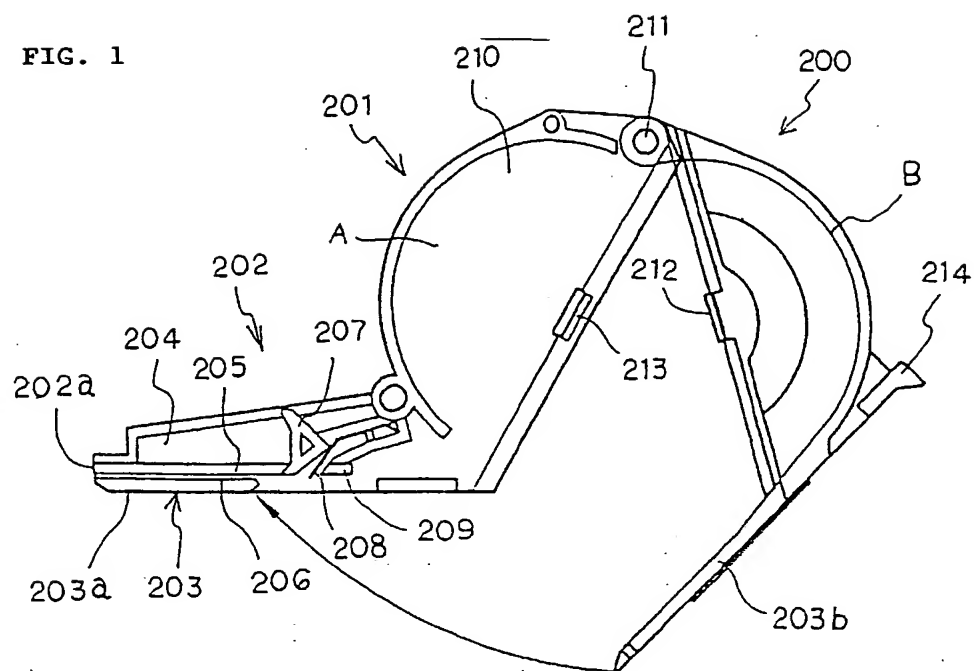


FIG. 2

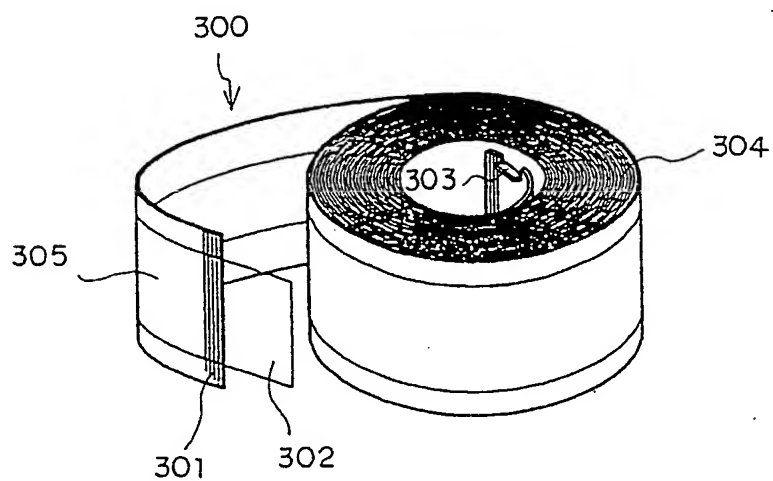


FIG. 3

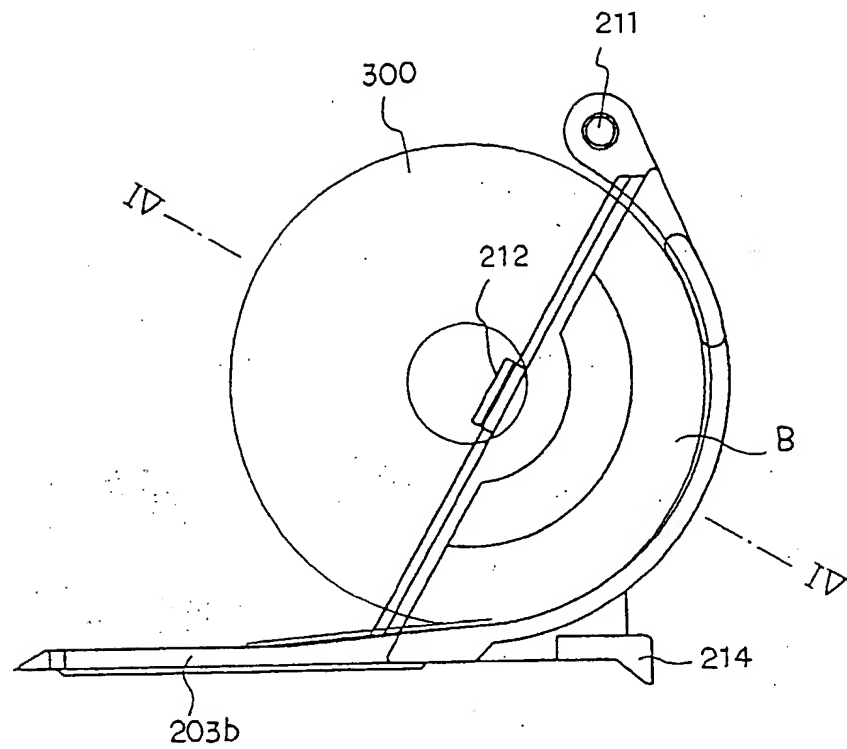


FIG. 4

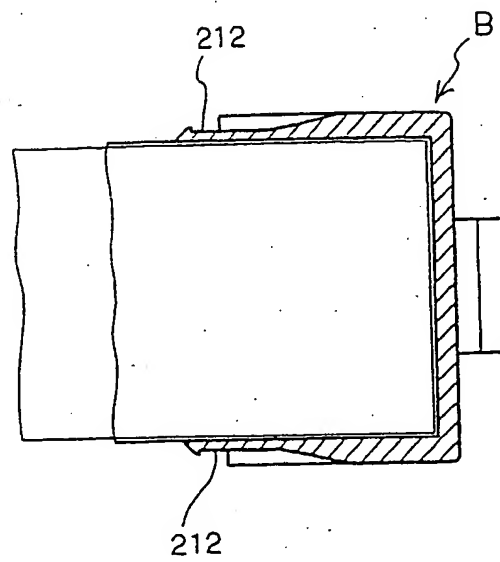


FIG. 5

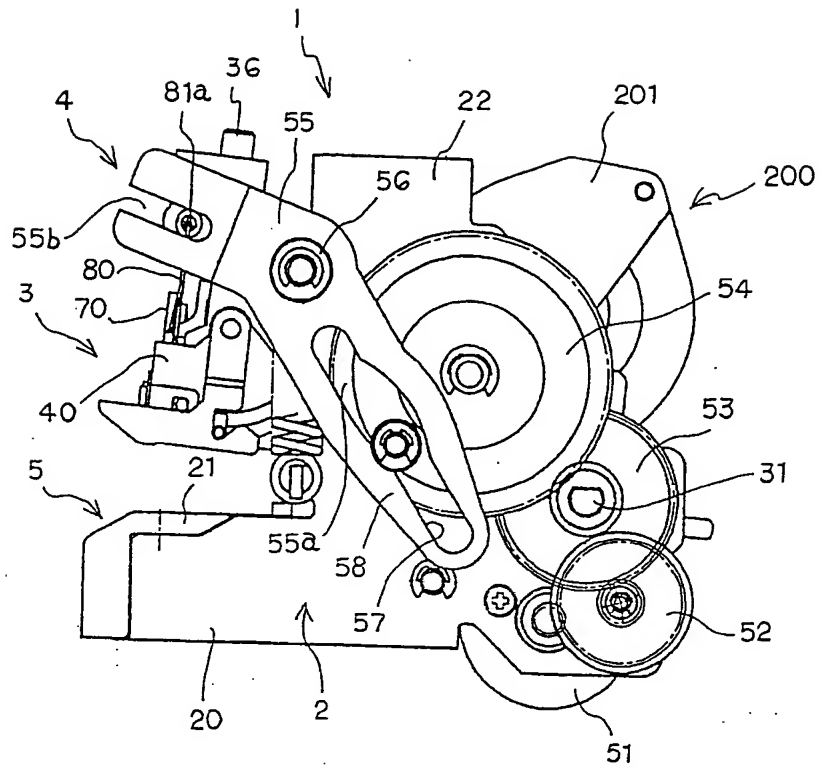


FIG. 6

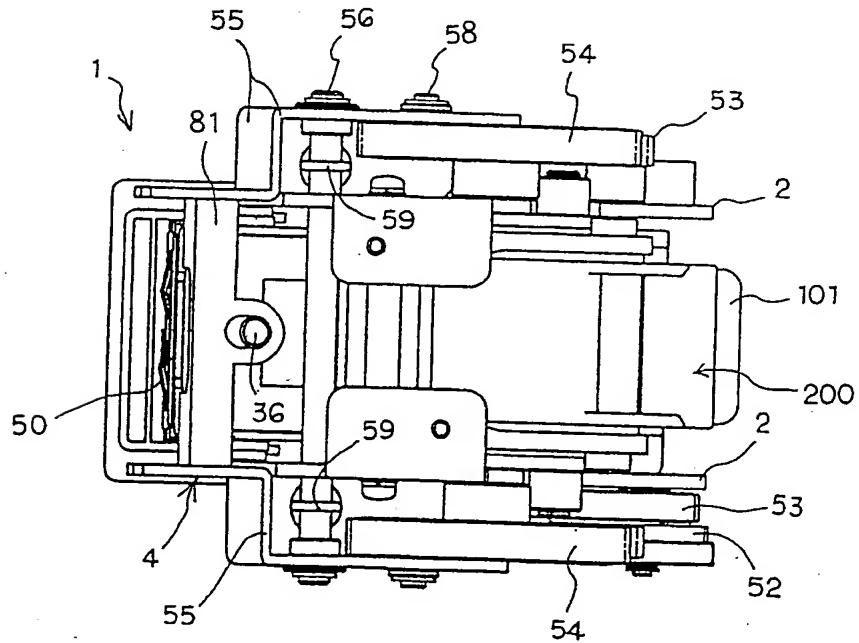


FIG. 7

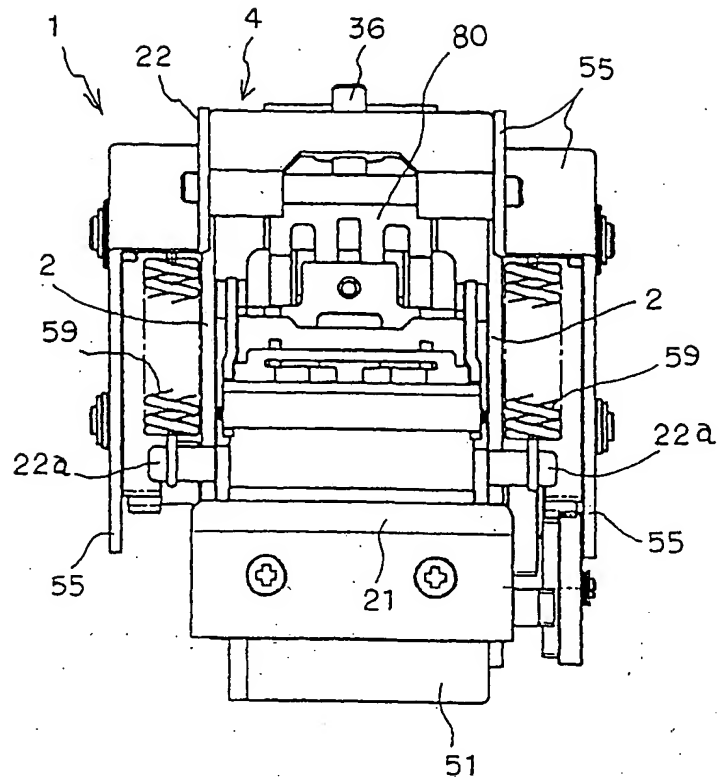


FIG. 8

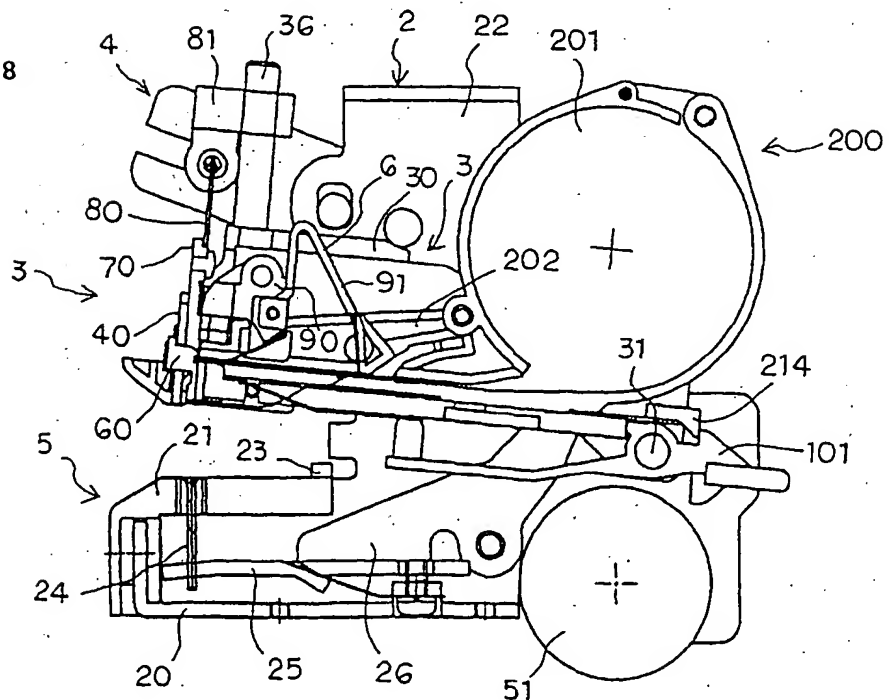


FIG. 9

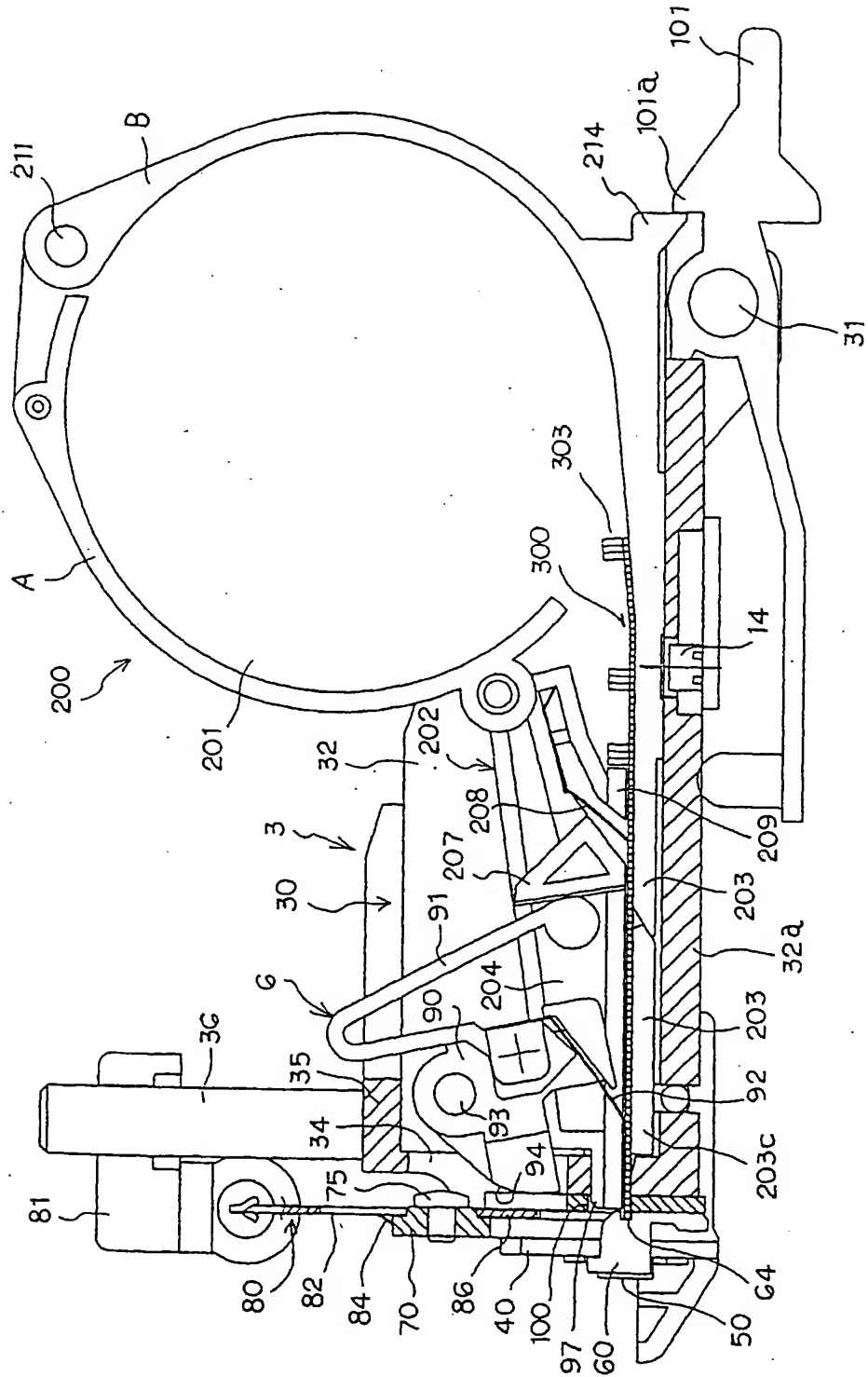


FIG. 10

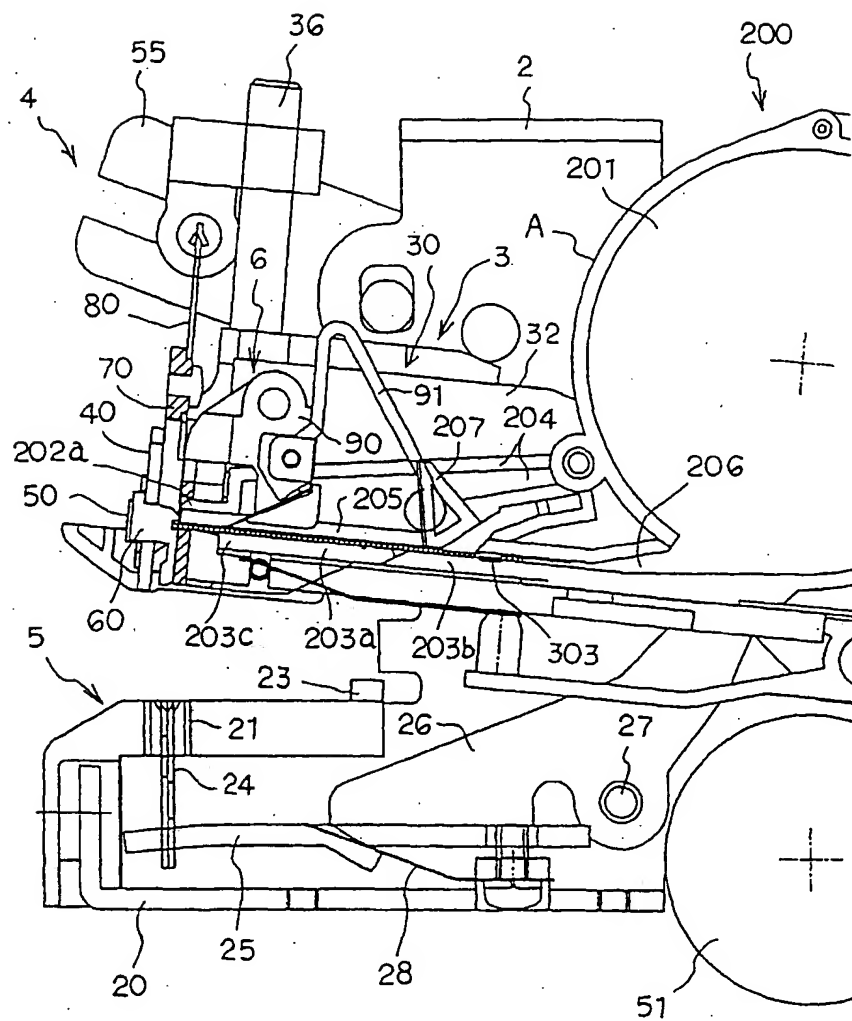


FIG. 11

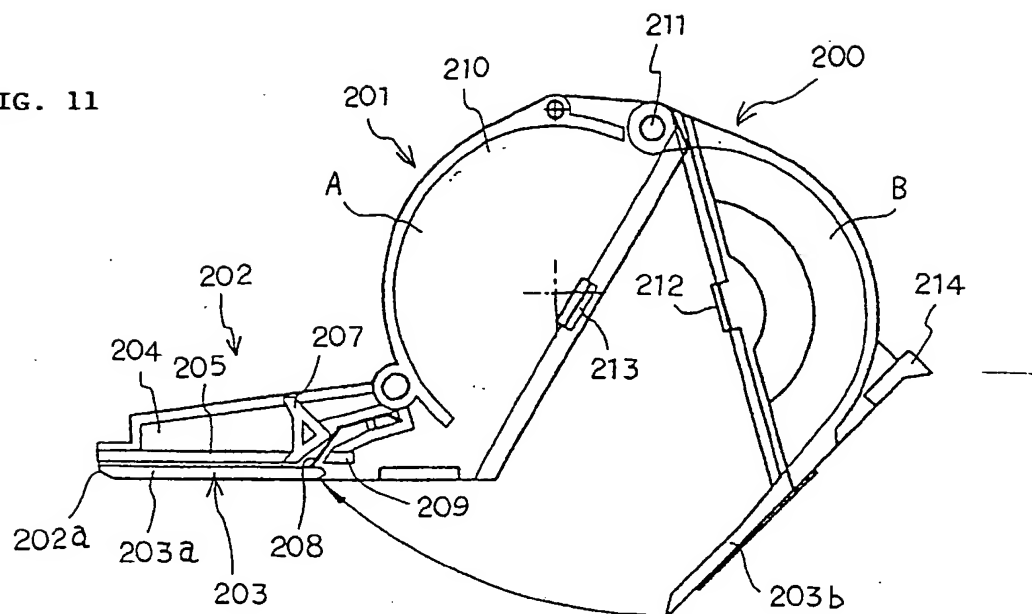


FIG. 12

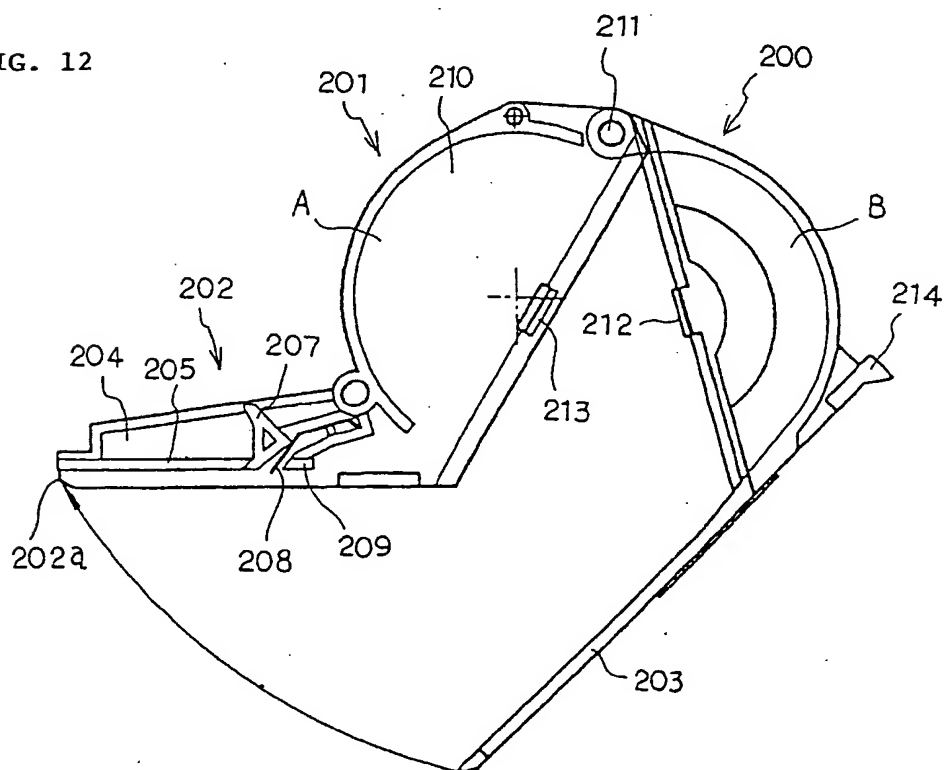


FIG. 13

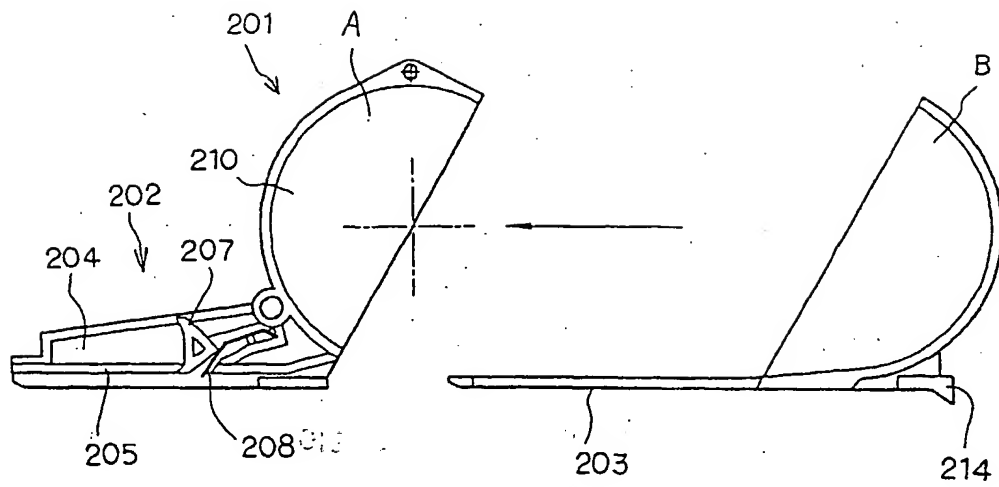


FIG. 14

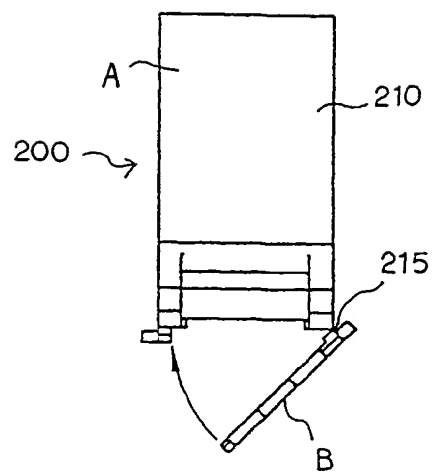


FIG. 15

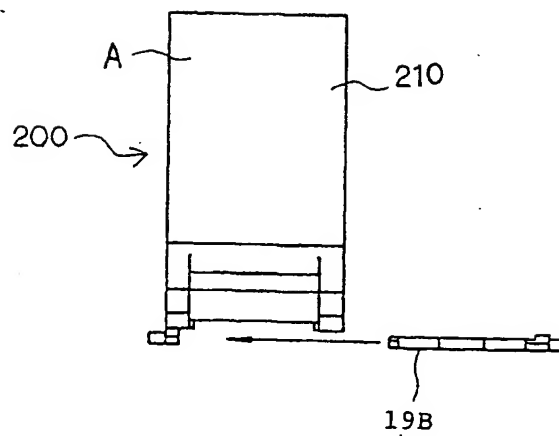


FIG. 16

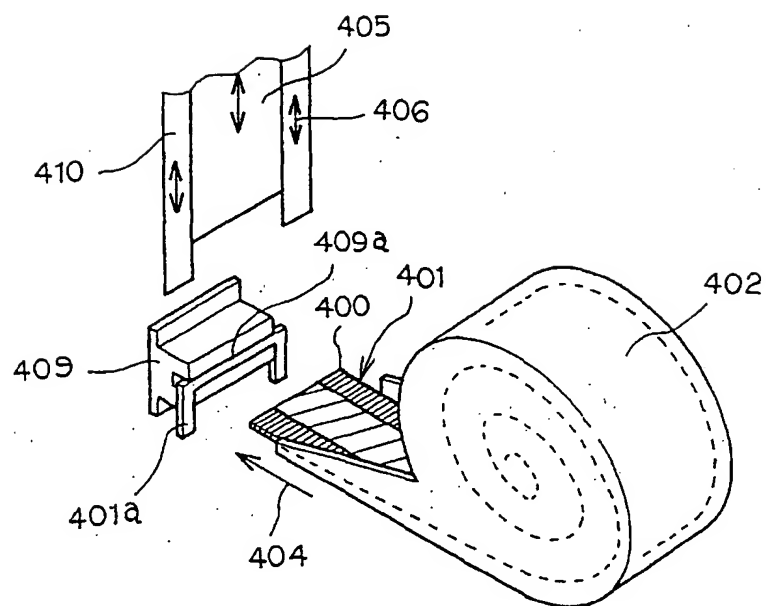
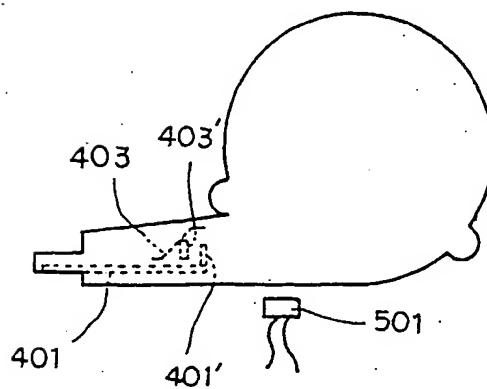


FIG. 17



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP96/03370

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl⁶ B25C5/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int. Cl⁶ B25C5/02, 5/04

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho 1926 - 1996

Kokai Jitsuyo Shinan Koho 1971 - 1996

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP, 1-146674, P (Canon Inc.), June 8, 1989 (08. 06. 89) (Family: none)	1 - 27
A	JP, 62-42981, U (K.K. Tachikawa Pin Seisakusho), March 14, 1987 (14. 03. 87) (Family: none)	1 - 27
A	JP, 7-15281, U (Max Co., Ltd.), March 14, 1995 (14. 03. 95) (Family: none)	1 - 27

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"Z" document member of the same patent family

Date of the actual completion of the international search

February 6, 1997 (06. 02. 97)

Date of mailing of the international search report

February 18, 1997 (18. 02. 97)

Name and mailing address of the ISA/

Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)